

**REMARKS**

Claims 17-34 stand rejected under 35 U.S.C. § 103 as being unpatentable over Sugiura et al. in view of Keller. In order to expedite issuance of this application, claims 33-34 have been canceled without prejudice/disclaimer to the subject matter embodied thereby. This rejection is respectfully traversed for the following reasons.

In order to help expedite prosecution, Applicants' representative initiated a telephone interview with Examiner Fourson. Applicants and Applicants' representative would like to thank Examiner Fourson for his courtesy in conducting the interview and for his assistance in resolving issues. During the interview, Applicants' representative emphasized that only Applicants have discovered that including hydrogen in the cooling process is desirable to enable avoiding degradation of a semiconductor surface state, so as to lead Applicants on an inventive inquiry on how to include hydrogen in the cooling process while maintaining a low-resistivity semiconductor layer.

In contrast, as was conventionally done, the cooling process of the cited prior art either does not include hydrogen, or if it does, results in a high-resistivity semiconductor layer. For example, Keller expressly teaches away from the claimed invention by suggesting a *hydrogen-free* cooling process so as to produce a low-resistivity layer (*see* col. 4, lines 29-36). Sugiura et al., on the other hand, discloses using ammonia/nitrogen during a natural cooling process and acknowledges that such a process will result in a *high*-resistivity layer (*see, e.g.*, Comparative Examples 1 and 2 described at col. 13, lines 42-63 and col. 14, lines 10-11 of Sugiura et al.).

Only Applicants have recognized that including hydrogen in the cooling process is desirable, and conceived of a suitable combination of hydrogen and cooling parameters, during the cooling process, that can result in a low resistivity semiconductor layer. Each of the

remaining independent claims embodies a cooling process being performed with a combination of hydrogen concentration in the atmosphere and cooling parameter such that the resulting p-type nitride semiconductor layer has a hole carrier concentration of approximately  $1 \times 10^{16} \text{ cm}^{-3}$  or higher at room temperature. Exemplary embodiments of such parameters are shown in Figure 6 of Applicants' drawings, in which hydrogen contents of 50%, 30% and 10% have approximate cooling times of 1 min, 1.8 min, and 4.1 min, respectively (*see*, page 22, lines 2-11 of Applicants' specification) to assure a hole carrier concentration of approximately  $1 \times 10^{16} \text{ cm}^{-3}$  or higher at room temperature (i.e., low resistivity semiconductor layer).

The Examiner is directed to MPEP § 2143.03 under the section entitled "All Claim Limitations Must Be Taught or Suggested", which sets forth the applicable standard:

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. (citing *In re Royka*, 180 USPQ 580 (CCPA 1974)).

In the instant case, the pending rejection does not "establish *prima facie* obviousness of [the] claimed invention" as recited in the remaining independent claims because the proposed combination fails the "all the claim limitations" standard required under § 103.

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as the independent claims are patentable for the reasons set forth above, it is respectfully submitted that all claims dependent thereon are also patentable. In addition, it is respectfully submitted that the dependent claims are patentable based on their own merits by adding novel and non-obvious features to the combination.

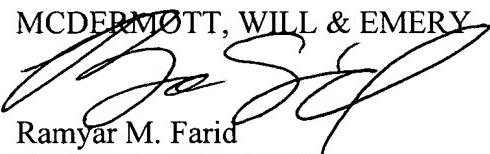
Based on the foregoing, it is submitted that all pending claims are patentable over the cited prior art. Accordingly, it is respectfully requested that the rejection under 35 U.S.C. § 103 be withdrawn.

**CONCLUSION**

Having fully and completely responded to the Office Action, Applicants submit that all of the claims are now in condition for allowance, an indication of which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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